

JPRS 77444

24 February 1981

West Europe Report

SCIENCE AND TECHNOLOGY

No. 47



FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available from Bell & Howell, Old Mansfield Road, Wooster, Ohio 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

24 February 1981

WEST EUROPE REPORT
SCIENCE AND TECHNOLOGY

No. 47

CONTENTS

CHEMICALS

- Industry Leader Interviewed on French Chemical Industry
(Jean-Claude Achille Interview; L'INDUSTRIE DU PETROLE
GAZ-CHIMIE, No 524, 1980)..... 1

ENERGY

- Lack of Direct Sunlight Poses Problem for Solar Project
(Jens Busch; NY TEKNIK, 15 Jan 81)..... 7
- Results of Magnetohydrodynamics Experiment Evaluated
(J. H. Blom; ENERGIE SPECTRUM, Dec 80)..... 9
- 'Carburol': Alcohol Fuels Program To Begin
(AFP SCIENCES, 15 Jan 81)..... 14
- Program Announced
1990: 25 to 50 Percent
Means of Production
Experiments in Other Countries

INDUSTRIAL TECHNOLOGY

- New Pig Iron Processes Compete for Early Commercialization
(Hans Werner; NY TEKNIK, 8 Jan 81)..... 18

SCIENCE POLICY

- 1981 Draft Budget for Ministry of Industry Presented
(AFP SCIENCES, 20 Nov 80)..... 20

Minister of Industry Strongly Supports Automation (Andre Giraud Interview; INDUSTRIES ET TECHNIQUES, 31 Dec 80).....	24
Briefs	
Industrial Strategy Examined	29

CHEMICALS

INDUSTRY LEADER INTERVIEWED ON FRENCH CHEMICAL INDUSTRY

Paris L'INDUSTRIE DU PETROLE GAZ-CHIMIE in French, Special Issue, No 524, 1980
pp 9, 11, 13, 15, 17

[Interview with Jean-Claude Achille president of the Union of Chemicals Industries by Jeanine Jacques and T. Shervanian: "The Chemical Industry in the Age of Reason;" date and place not given]

[Text] [Question] One could doubtlessly draw up now a balance sheet for the French chemical industry for 1980. Have its positions in the world, its place in the national economy, its evolution, varied, Mr President, during the year now ending?

[Answer] In relation to 1979, the figures reflecting the position of French chemistry vis-a-vis its neighbors, or of the chemical industry vis-a-vis other industries, have not varied much in 1980. The 1980 turnover for chemistry, in the INSEE [National Institute of Statistics and Economic Studies] sense, will be on the order of 160 billion francs, which represents about 10 percent of the added value of French industry. On the international level, the French chemical industry is in fifth place in the size of its production and in third place in the world in the amount of its exports, roughly equal to Great Britain.

From one year to another, either the FRG or the United States is in first place. The French chemical industry has had a steady increase over the last 10 years, and a slightly faster one than that of most of our neighbors. It is therefore holding its place well in European chemistry, which, as we know, covers one-third of the world market for chemical products.

These are the basic data. But it is clear that 1980 falls into two very distinct parts. The first 4 months were a sequel to 1979. They continued to show very rapid progress, since the chemical industry's volume, as in the preceding year, was increasing on the order of 8 percent. But this situation could not last normally. As in the majority of the big producing countries, after the English and the Americans, and a little ahead of the West Germans, we saw the situation change abruptly in a very few months. There was a rapid drop in our activity. After the second oil shock of the end of 1979-beginning of 1980, we saw a phenomenon analogous to what occurred after the first shock of the end of 1973-beginning of 1974: our customers, who feared both a supply shortage and a strong rise in prices, accelerated their demand.

This time, the phenomenon has probably been faster and shorter: for 3 to 6 months, depending on the country and the products, precautionary purchases again brought

about excessive demand; but once stocks were reconstituted, demand declined sharply. The outlook for stabilization of raw materials, together with the prospect of stabilization of interest rates, has strongly reduced the propensity to stockpile.

[Question] Hasn't the international environment also played a role in this evolution? What forecasts do you make for events to come?

[Answer] The recession produced in the United States has accentuated the movement, of course. The American chemical industry, which represents 25 percent of world production, has tried to compensate on the international market for the consequences of a particularly gloomy domestic situation. The effects of this effort have been felt closer and closer to home since April-May 1980. Because of the vacation period, opinion was not aware of this situation until September.

No one can say how long this unfavorable climate will last. One might think that since the phenomenon was an abrupt one, the recovery could occur with the same abruptness, but such a view has no rational value. Now that stocks have been got in order, the speed of the recovery will depend on the situation in the United States, the psychological reactions vis-a-vis the events in the Middle East, and the prices of petroleum products. We hope that expansion will resume in a gradual manner, without fits and starts, because it is not healthy for the industry to go through relatively favorable periods and sudden dips.

Actually, no one is capable of mastering the situation, because it depends on psychological phenomena. The buyers follow very closely what happens in the raw-materials market. One need only speak of a petroleum-products price rise, of greater tension in the Middle East, and a situation that appeared stable at the level of stocks reverses rapidly. All prognostication is impossible in this matter: the situation is less tense in the oil markets than in 1979. But who, last July, could have foreseen the war that broke out between Iran and Iraq in September? Up to the present, everyone has been very coolheaded, but no one can swear that this will continue.

[Question] One is surprised to note that the prices of naphtha are not following the movements of the petroleum products. Is it because the prices, as they go downstream, undergo a certain "loss of pressure"?

[Answer] The "spot" prices for naphtha were above the quarterly prices, then in the last 6 months they have fallen below them. The phenomenon is a complex one. It is normal at the beginning of winter for a price rise to occur for the fuels used in heating installations and thermal power plants and a relative easing of them for petrochemical naphtha, automotive fuels go along [as published]. The downward trend of naphtha prices is doubtlessly reinforced by the economic environment in the trade. In this situation, one cannot measure the effects of the initiative taken by certain big European chemical producers in publishing the average prices of naphtha: this kind of operation cannot be judged over so short a period.

[Question] The French chemical industry, which holds a privileged position in the international markets, has to face many problems in this area: enlargement of the Common Market to Spain and Portugal, compensation with the USSR, exchanges with China, Japanese competition, etc. What importance do these concerns have for the current results and for the trade's future prospects?

[Answer] The enlargement of the Common Market presently involves far more the Spanish chemical industry, which is already beg, than the Portuguese industry, which, with the Sines projects, is only in its beginnings.

Like all other French activities, the chemical industry would like to have no transitional period, or a period as short as possible. Our major concern is to normalize the exchanges between France and Spain, to make the conditions of exchange with Spanish products--which today are favored by the existing trade agreements--better-balanced. This situation relates essentially to the production in southwestern France, which is in a position of inferiority vis-a-vis Spanish competitors. In other words, we would like to see a regime of more "equitable" exchanges substituted for the previous agreements.

As for the problems posed by the "compensations," they were talked about less in 1980 than in 1979, for a very simple reason: the difficulties encountered by the Soviet economy and the delays in execution of the plans are no secret to anyone. Many echoes of this are found in the Soviet press. Furthermore, a series of events has disturbed the programs in the USSR: the harshness of the winter, the events in Iran, have had fallout on all the countries of the East. Nevertheless we shall get back to this problem of compensations, perhaps even rapidly.

The outlooks for exchanges with China are somewhat of the same nature: the Chinese continent wants to open up more widely to foreign trade. And the leaders of Peking would like to impose compensations in their trade relations. This is nothing new: without going into debt--which they have little desire to do--the Chinese cannot reasonably expect to export a large part of their production when it is barely sufficient to cover their domestic needs--their food and clothing needs, among others.

For these reasons, the process of increasing exchanges with China will be a long one, and lightning developments are not to be expected: the nature of things does not permit it.

Despite a few brilliant successes, the balance of our chemical exchanges with China shows a deficit. We are presently buying essential oils and furfural from it, but our exporters have a hard time fighting the Japanese competition.

Japan has obviously carved the lion's share for itself, not only in China but throughout the Pacific zone. Nevertheless, the oil crisis has led the Japanese chemical industry to review its choice, to change course in its strategy. Some 15 years ago, the Japanese had equipped themselves with sizable capacities in fertilizers, plastics, textile fibers, with which they flooded the markets of Southeast Asia, Latin America, the west coast of the United States and even Europe.

But with the oil shock of 1973, they took note of the fact that they were no longer in a good position for these products, which incorporate a lot of energy and raw materials that they are obliged to import. They beat a big retreat in these areas and reduced their investments, hindered also by the environmental problems.

In fact, the Japanese preferred to concentrate their projects on Taiwan, South Korea, Indonesia and the Middle East, where there are an inexpensive labor force, widely available raw materials, and interesting economic outlooks. In parallel, they launched into development of a series of products with high added value for which they hold the leadership. Thus it is that they have revived their policy and

and improved their techniques in the area of fermentation. The Japanese, who have very long experience in this area with their work on rice, have a considerable headstart in this sector, which appears to have broad prospects. The positions held by Japan are not of heavy volume yet, even if its production is beginning to be found in the European markets.

[Question] And what is the situation with the developing countries (PVD)?

[Answer] There is frequent talk of the possibility of a division of labor between the industrialized countries that have the technique and specialized labor force, and the developing countries that produce oil. This prospect is possible, even probable, but making it a reality will take time. Before supplying the industrialized countries with sizable quantities of intermediate products (ammoniac, ethylene), the developing nations must acquire an industrial tradition and adapt their social and political structures to these activities, for it is not easy to create out of nothing complexes that are capable of rivaling the Western achievements.

Like the countries of the East or China, the PVD's will have several domestic needs to satisfy at the same time as they concern themselves with the world markets. In fact, for all these problems that you cite, the evolution will be slow: it was in 1974 that the first projects were worked out, but it will probably be 1985 or rather 1990 before abundant production comes. Between now and then, the competition from these countries will be less formidable for the Europeans than the American competition.

[Question] What areas does the competition from the United States relate to? Isn't the gap between Europe and the United States going to be filled with the new American energy policy?

[Answer] The problem has several aspects. A series of questions arises: the value of the dollar, the cost of labor, tariff policy, productivity, etc. But these aspects are secondary in the face of a major reality: the cost of access to raw materials. For natural gas, naphtha, the phosphates, the United States, which is the world's leading producer of them, has prices from 20 to 60 percent lower than what the Europeans must pay. This fact has two series of consequences. In the European markets, the occurrence of less expensive products (chemical fibers, styrene, monomer vinyl acetate, nitrogenized solutions used as fertilizers, etc) perverts the free play of competition and endangers the very existence of activities important for the economy and employment.

The Brussels Commission has put into play several Community defense measures that can produce some modest effects. But we cannot employ similar mechanisms in the third markets of Southeast Asia or Latin America, where the United States sells its products (plastics especially) at prices that are hard to beat. and is leading the Europeans and the Japanese a hard life in their traditional markets. Europe, which provides one-third of the world's production of chemical products, is particularly sensitive to this new situation that occasioned a 50-percent increase in American exports in 1979.

Some base their hopes on the new American energy policy. It is doubtlessly a surer thing to count on an eventual economic recovery in the United States than on an alinement of American oil prices with the world prices if one hopes for a return to more normal conditions of Europe-United States competition.

The Energy Act should begin to produce its effects for naphtha at the end of 1981, and for natural gas, only in 4 to 5 years. Discussions are taking place to determine whether natural gas will continue to be the principal raw material for the American chemical industry. The new petrochemical plants use a broader range of petroleum fractions and use heavier charges. But with the revival of coal substituting for gas for certain nonchemical uses, the natural-gas chemical industry is capable of retaining its preeminence. Furthermore, a rise of gas prices by \$1 or \$2 per million BTU's [British Thermal Units] would be enough to reactivate exploration and production on American territory.

[Question] In the upheaval caused by the oil crisis, what is the future of the French chemical industry? Hasn't petrochemistry been the victim of these mutations?

The French chemical industry should maintain the credit balance in its international exchanges this year. But in the present circumstances, it will be difficult for us to do any better. The "big maneuvers" of which petrochemistry has been the object have to be judged with the retreat that is being imposed. Since 1973, for all the big organic products at several francs per kilo, the proportion of raw materials of petroleum origin has grown considerably. It has risen from 25-30 percent to 60 percent or more; in addition, the raw-materials supply prices have become unstable. Because of this, the working methods of the different producers have been modified remarkably.

For a basic-chemistry company, it is important to have supplies available that have favored--or more precisely, regularized--status. The FRG, British, Dutch companies that are not integrated with oil companies have long-term supply contracts, like those of the American groups to some extent. For the French chemical enterprises, such situations are infrequent. Likewise, the French chemical producers have not had the habit or the possibility of having financial capacity available that would make it possible to cope with the bad years. These appear to me to be the underlying reasons for rapprochements in favor of companies that have better financial capacities or more regular conditions of supply.

The changes of frontiers in French petrochemistry to which you allude are therefore largely the consequence of growing imbalances in the supplies of petroleum products at the same time as the competition is getting livelier for the products downstream. A phenomenon of the same nature was experienced at the birth of the coal-chemistry industry, which led the producers of oven gas and tar to integrate downstream. I am convinced that French petrochemistry will be able to develop at the same rate as its European partners.

[Question] Is the crisis that the chemical industry is going through in the nature of things? What prospects do you see for this activity that seems to be seeking a new equilibrium?

[Answer] The oil crisis has only accelerated an evolution which in any case was scheduled for the future. The chemical industry (basic materials and plastics) could not in any case live for long with 15-percent expansion rates; such a rate belongs to activities that have not yet reached their maturity. With the oil shock, the chemical industry has learned to save energy and raw materials, to include recycling in the lifetime of a product, to improve competitiveness, the performance of its production.

In fact, the chemical industry is taking up the challenges presented by events.

Contrary to what one might have thought, it has rather improved its performance, its relative positions vis-a-vis older competing products. To refer just to plastics, for example, the margins of advance remain bigger than those of the other traditional materials. Whereas the performance characteristics of the classical products, known for centuries, improve only very slowly, the plastics, on which serious work has been done for only 30 years, still have spectacular developments ahead of them because of new technologies (grafting, reticulation, etc); the utilization of complex materials thanks to plastics is still only in its beginnings. The more progress is made in these inventions, the more one acquires independence from energy and raw materials, and the greater becomes the knowhow factor in added value. Furthermore, the chemical industry is only at the beginning of the revolution that it can bring about in people's lives. With the oil crisis, it has suffered a childhood illness, it has in a way reached the age of reason when it becomes aware of its limits but also of its possibilities.

The chemical industry is still far from having revealed all its facets, from having explored the multiple choices that it can offer to humanity.

11267

CSO: 3102

ENERGY

LACK OF DIRECT SUNLIGHT POSES PROBLEM FOR SOLAR PROJECT

Stockholm NY TEKNIK in Swedish 15 Jan 81 p 2

[Article by Jens Busch: "Major Problems for Solar Project"]

[Text] Assembled solar collectors do not function in the climate. That is the conclusion expected to be reached after 2 years of operation of a solar heating installation at Ingelstad outside of Vaxjo. The Lambohov project at Linkoping, the largest of its kind in the world, is also having difficulty. But its problem is with the piping installation, not with the solar collectors.

At Ingelstad there are than 400 assembled solar collectors. In each one a parabolic reflector of metal concentrates the sunlight against a pipe containing water at the focus of the reflector. The solar collector turns with the sun during the day.

Approximately 1,500 hours of sunlight per year had been estimated. In 1980 there were 1,260. But there is a difference between kinds of sunlight. The concept is not defined with reference to direct rays of sunshine versus diffuse. At Ingelstad it has been proved that a large portion of the 1,260 hours consisted of diffuse sunshine. And the solar collectors only collect direct rays of sunshine.

"Even under a clear sky the diffuse sunlight is a large part of the sunshine," said Hans Andren of the firm Teknoterm, which built the solar collectors.

"We understood from the beginning that there would be problems with the assembled solar collectors and tried to get the employer (the Swedish Council for Building Research) to, at least in part, exchange them for flat solar collectors which will also receive diffuse sunshine."

Cost: 9 Million

The Ingelstad project will continue for at least one more year. Then it will be written off, and eventually the collectors will probably be replaced wholly or in part by flat solar collectors.

The collectors which are located at the Ingelstad project cost about 2.5 million kronor. The entire project cost about 9 million. Fifty-two small houses should have been heated and supplied with hot water.

Another solar heat project, the largest of its kind in the world, has also been plagued by problems. That is the Lambohov installation at Linkoping. It functions in part beyond expectations, with solar collectors which are the flat type, and a storage reservoir.

"It is the heating system for the 56 houses which does not work. Air enters the system and the pipes become air bound. It results from a construction error in standard parts," said Jan Svensson, project leader for the solar collectors and works manager.

There is also a leak in the system, but they have not yet been able to localize it.

9287

CSO: 3102

RESULTS OF MAGNETOHYDRODYNAMICS EXPERIMENT EVALUATED

Anstelveen ENERGIE SPECTRUM in Dutch Dec 80 pp 287-294

[Article by J. H. Blom]

[Excerpt] The research into the use of MHD generators in power plants has, during the last 10 years, primarily been directed toward the so-called open-cycle MHD system. The progress of this research was outlined in a recent article in this periodical (1).

Since 1965, research has been done at the Technical University at Eindhoven into MHD generators, working according to the closed-cycle principle.

This article attempts to present arguments, justifying the research into closed-cycle MHD systems. At the same time, some recent results are reported with regard to the so-called blow-down experiment undertaken by the Direct Energy Conversion group at the Technical University at Eindhoven.

Open and Closed Cycle MHD Systems

The principle of the MHD generator is shown in Figure 1. The types of MHD systems working with gaseous media will be discussed first.

a. The open-cycle MHD systems derive their name from the fact that, as shown in Figure 2, the outlet of the generator is in open connection with the outside air via the steam boiler. This system uses the exhaust gas directly as a medium for the generation of electricity. Despite the addition of potassium and cesium salts to make the conductivity of the gas sufficiently high, the temperature of the plasma has to be 2,700 to 3,000 K. Since most ceramic materials cannot withstand this temperature, the generator walls must be cooled. This means that an optimum yield is only attained by the use of big ducts, of the magnitude of 1,000 MW thermally, since the volume-surface ratio will then be sufficiently favorable. A disadvantage of this open-cycle system are the problems of materials arising at these temperatures and the presence of an oxidizing medium in insulators and electrodes. Finally, the physical properties of the medium are dependent on the type of fuel used.

For this reason, it is desirable to fire one type of fuel during the lifetime of the power plant. For the future power plants, operating according to the open-cycle MHD principle, coal is used in most countries as fuel.

The present research concentrates on the development of efficient combustion chambers for coal and on the interaction between the fluid slag layer of the coal deposited on the walls of the generator and the materials of which the walls, especially the electrodes, are made. Also the separation of these slags, in the meantime bound with the material added to make the conductivity of the gas sufficiently high in the boiler is the subject of research. The development of a high temperature air heater (1,500-2,000 K) executed as heat exchanger toward the exit of the MHD generator (not shown in Figure 2) is of importance in order to obtain an optimum yield of the system. The first plants designed in the United States do not make use of this air heater but use air enriched with oxygen as oxidizing medium. Extensive programs in the area of open-cycle MHD generators are carried out in the Soviet Union, the United States, Japan, China, Poland, India, and Yugoslavia.

i. The closed-cycle systems derive their name from the fact that the medium is in a loop which in itself is closed. It appears from Figure 3 that all the heat must be added to the medium (i.e. a noble gas) via a heat exchanger. This is a drawback of this system, which has been developed as a conversion system for gas-cooled nuclear reactors. A group from Saclay (2) was the first to propose the use of fossil fuels for the heating of the noble gas. Through the use of noble gases such as argon, with a small active section for electron-atomic collision, the electron temperature can increase above the gas temperature in this type of generator because of the dissipation of the current in the medium. Since the electron temperature determines the conductivity of the plasma, it is possible to work with relatively low temperatures of 2,000 K, while the plasma still has a good conductivity. This effect is called 'non-equilibrium ionization.' Since the electron temperature is disconnected from the gas temperature, instabilities may occur in the plasma, which has an adverse effect on the operation of the generator. With the relatively low temperature and the non-oxidizing medium, the duct walls and electrodes can be designed for the required plasma temperature without cooling, so that the heat loss will be low. Consequently, relatively small units of about 100 MW thermally can already be used in practice (3). As insulating material, aluminum oxide, and as electrode material molybdenum or tungsten, may be chosen. Because of the relatively lower temperatures and the non-oxidizing medium, the problems with regard to materials are smaller than in the case of the open-cycle system. The effect of non-equilibrium ionization decreases when the plasma has an impurity degree of more than 100 to 1,000 ppm, depending on the type of molecular impurity. This puts special demands on the heat exchanger which heats the argon plasma. The presence of this heat exchanger makes the system suitable for many sources of heat with a temperature of 2,000 K.

Before the seventies, most countries in Europe had research programs in the area of closed-cycle MHD systems, which aimed at coupling with a gas-cooled nuclear reactor. Around 1970, it became clear that a reactor of this type with a temperature of 2,000 K would not be developed in the foreseeable future. This resulted in a stoppage of the research programs in Germany, France, Italy and Sweden. In the United States, Japan, Great Britain, and the Netherlands, the research was continued on a modest scale.

At Eindhoven, the argument for continuing the research into closed-cycle systems was the following: Although the potential source of heat has fallen away, there will always be the need for a conversion system of heat to electric energy with a high yield which can make use of various sources of heat.

Conclusion

The closed-cycle MHD system has a number of attractive advantages over the open-cycle MHD system. The heat exchanger, which conveys the heat to the argon, constitutes an important part of this system. In recent tests with the Eindhoven blow-down experiment, such a heat exchanger has been tested with respect both to the production of thermodynamic magnitudes and to the molecular impurities and dust. The heat exchanger as well as the other parts of the experiment satisfy completely the criteria aimed at in the study. Through the preheating loop to be installed in cooperation with the Department of Energy, MHD ducts may also be tested which have been designed for stationary operation.

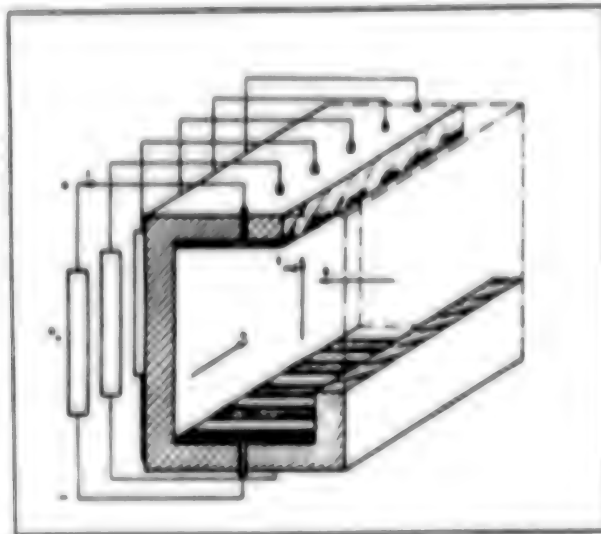


Figure 1. Principle of MHD Generator. The plasma flows at a rate of v in a direction perpendicular to the magnetic field B , whereby an electric field E_{ind} is induced in the plasma. As a result of the electric conductivity of the plasma, a current I will flow through the outside load R_L .

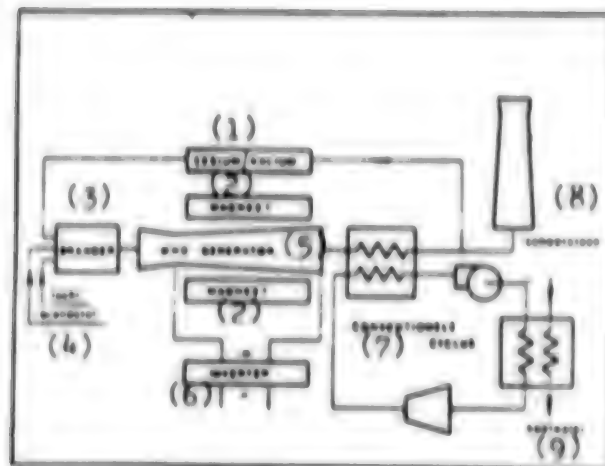


Figure 2. Diagram of Open Cycle MHD System

Key:

- | | |
|---------------------|-----------------------|
| 1. Cesium/Potassium | 6. Inverter |
| 2. Magnet | 7. Conventional Cycle |
| 3. Burner | 8. Chimney |
| 4. Air Fuel | 9. Cooling Water |
| 5. MHD Generator | |

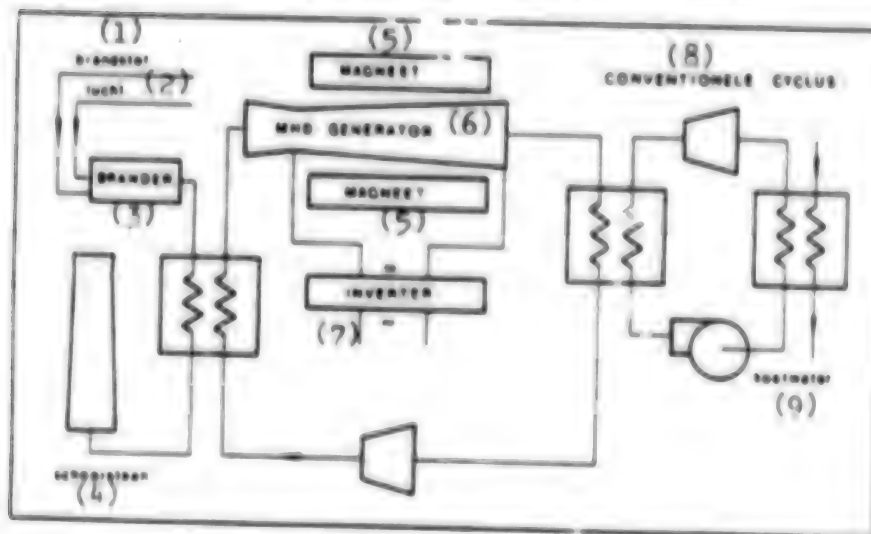


Figure 3. Diagram of Closed Cycle MHD System

Key:

- | | |
|------------|-----------------------|
| 1. Fuel | 6. MHD Generator |
| 2. Air | 7. Inverter |
| 3. Burner | 8. Conventional Cycle |
| 4. Chimney | 9. Cooling Water |
| 5. Magnet | |

BIBLIOGRAPHY

1. Van der Laken, R. A.: MHD Conversion: Recent Progress in the Development, *ENERGIESPECTRUM*, Vol 3, p 82, 1980.
2. Aalbert, J. P. et al.: Theoretical Calculations on the Noble Gas Closed Cycle MHD Loop Fired with Fossil Fuels and First Experimental Results with this Scheme, *ENERGY CONVERSION*, Vol 10, p 177, 1970.
3. Carstens, C. and F. J. C. Schellens: Feasibility Study 25 MWe MHD Plant, Report PDO No (B) 75-241, PDO Technische Adviseurs BV, Amsterdam, 1975.
4. Blom, J. H.: The MHD Blow-Down Experiment at the Technical University at Eindhoven, *NEDERLANDS TIJDSCHRIFT VOOR NATUURKUNDE*, A45, Vol 4, p 154, 1977.
5. Blom, J. H. et al.: High Power Density Experiments in the Eindhoven Shock Tunnel MHD Generator, 6th International Conference on MHD Electrical Power Generation, Washington, Vol III, p 73, 1975.
6. Blom, J. H. et al.: Design of the Eindhoven 5 MW Thermal MHD Blow-Down Experiment, 17th Symposium Engineering Aspects of MHD, Stanford University, P. H. 4.1, 1978.
7. Blom, J. H. et al.: Enthalpy Extraction Experiments at Various Stagnation Temperatures in a Shock Tunnel MHD Generator, 15th Symposium Engineering Aspects of MHD, Philadelphia, p VI 5, 1976.
8. Veefkind, A. et al.: Noble Gas MHD Generator Experiments at Low Stagnation Temperatures, 17th Symposium Engineering Aspects of MHD, Stanford University, P. H. 3.1., 1978.
9. Zlatanovic, M. et al.: Performance of a Closed Cycle MHD Generator with Molecular Impurities, 17th Symposium Engineering Aspects of MHD, Stanford University, P.H.2.1, 1978.
10. Hellebrekers, W. M. et al.: Experimental Fluctuation Analysis in a Noble Gas MHD Generator, 16th Symposium Engineering Aspects of MHD, Pittsburg, PA, p II.3.14, 1977.
11. Hellebrekers, W. M. et al.: Experiments on the Non-Uniform Discharge Structure in Noble Gas MHD Generators, 18th Symposium Engineering Aspects of MHD, Butte, Montana, p D.2.4.1, 1979.
12. Veefkind, A. et al.: Investigations of the Non-Equilibrium Condition in a Shock Tunnel Driven Noble Gas MHD Generator, 7th International Conference on MHD Electrical Power Generation, Boston, MA, Vol II, p 703, 1980.
13. Blom, J. H. et al.: First Experiments with the Eindhoven 5 MW Thermal Blow-Down Experiment, 7th International Conference on MHD Electrical Power Generation, Boston, MA, Vol I, p 102, 1980.

ENERGY

'CARBUROL': ALCOHOL FUELS PROGRAM TO BEGIN

Program Announced

Paris AFP SCIENCES in French 15 Jan 81 p 6

[Text] By 1990, 25 to 50 percent of the fuels used for transport in France should be of national origin and come from "carburols"; carburols are alcohols which can be mixed with hydrocarbons without affecting their quality and use.

This was reported on 14 January at the council of ministers session by Mr Andre Giraud, the minister of industry, as he was presenting the future research program to develop carburols. The minister discussed the main programs and spelled out time frames for development.

In the first phase, technical simplifications will be made in super grade gasolines so that increasing amounts of carburols can be added gradually. In the second phase, by 1985, the goal is to create and distribute a specific fuel with a higher blend ratio of about 25 to 50 percent, so that this replacement fuel may amount to a "significant" percentage of the total consumption.

1990: 25 to 50 Percent

Paris AFP SCIENCES in French 15 Jan 81 p 28

[Text] Carburols, a nonpetroleum product, could make up 25 to 50 percent of the automotive fuels by 1990, according to the government. This is an "ambitious but not unrealistic goal," feels the minister of industry.

On 14 January Andre Giraud told the press that the government had given a "green light" for the introduction of a maximum of 10 percent alcohol in super-grade gasolines, in order to reduce the risks of petroleum shortages to consumers.

Government officials are now waiting for inventors to submit their proposals for carburols, using bases of coal, gas, corn stalks, or Jerusalem artichokes. A favorable rating from government experts is essential before the sale of an alcohol-petroleum blend will be allowed.

The minister of industry was unwilling to make any precise prediction about the date of sale of the first liter of carburol. To some extent, drivers will be using alcohol without knowing it, since Mr Giraud indicated that gasoline pumps will not state the composition of the fuel being sold.

After some years of experimenting with carburol, the government will study the possibility of creating a special distribution system for a blend containing from 25 to 30 percent alcohol, added Mr Giraud.

"I will be very surprised if the oil companies are not the first in line to act as agents to handle carburol, since they are going to lose part of their market for ordinary fuels," said Mr Giraud.

The secretary of state for food and agriculture industries, Mr Michel Debatisse, commented on the interest of the carburol program in terms of developing lands for agriculture which are not in use now. For example, 1.5 million hectares would have to be planted in Jerusalem artichokes to obtain a carburol production that could cover 25 percent of the French consumption of automotive fuels (one hectare of Jerusalem artichokes "produces" from 3 to 5 tons of fuel).

Among the procedures for producing carburols, Mr Giraud mentioned that the methanol method, which uses coal, gas, and wood as raw materials, had already reached an industrial stage in some other countries. The acetone-butyl, or plant method, can produce fuels that can "completely replace" super grades of gasoline, pointed out the minister.

Mr Giraud estimated that gas generation--by the use of wood--might be an interesting alternative for some trucks. The minister of industry did feel, however, that the procedure of manufacturing ethanol by distilling beet juice was "too expensive," and said that he was "very pessimistic" about the future of synthetic coal-based gasolines. The coal liquefaction method, which is only possible with cheap coal, is not well suited for France, he said.

Means of Production

Paris AFP SCIENCES in French 15 Jan 81 p 29

[Text] Carburols, which will be used to partially replace petroleum in automobile tanks, according to the program drawn up by the French Government, are oxygenated products (alcohol) not derived from petroleum, which can be used alone or blended with hydrocarbons. The specific properties of these carburols give them qualities superior to traditional hydrocarbons, such as high octane ratings.

Four methods can be used to produce carburols:

- a. Methanol from raw materials such as wood, coal, gas, lignite, etc. Gas is produced in a gas generator and then transformed into methanol by a catalyst.
- b. An "acetone-butyl" blend from plant materials such as straw, corn, Jerusalem artichokes, sugar beets, alfalfa, etc. This method uses hydrolysis and fermentation.
- c. Ethyl alcohol by the fermentation of sugars or starches.
- d. Synthetic gasoline from coal or gas.

The first two methods will make up the "main framework" of the French plan. The ethyl alcohol method is being held in reserve because of its high costs (2 to 3 times the cost of super grades of gasoline) and ethanol blends poorly with hydrocarbons. And the fourth method, synthetic gasoline, was not chosen because of its cost, and because transformation into methanol seems the best way of liquefying coal.

New resources for the finalized program. To move rapidly toward significant and economically competitive industrial applications for carburols, we must, according to the minister of industry, mobilize substantial new resources for the finalized program.

The operators of this program, acting under the ministry of industry, will include, assembled in this way for the first time:

- a. The IFP [French Petroleum Institute] and in liaison with the IFP, the IRCHA [Applied Chemistry Research Institute].
- b. The COMES [Solar Energy Commission].

- c. All of the organizations, including the CERCHAR [Center for Studies and Research on French Coal Mines], which are taking part in the coal promotion program (gasification) sponsored by the ministry of agriculture.
- d. The INRA [National Agronomy Research Institute].
- e. The CNEMA [National Agricultural Machinery Research Center].

Among other topics, these studies will focus on the transformation of the biomass studied, on the scale of demonstration units; several pilot units will be started in 1981 and 1982.

Research will be accelerated in the area of the automobile and in coal gasification problems.

In all, this is a finalized program costing over 120 million francs. Of this amount, 100 million francs will be spent by the government, starting in 1981. This is 3 times more than all the work done to date.

Experiments in Other Countries

Paris AFP SCIENCES in French 15 Jan 81 p 30

[Text] Several countries have begun programs to produce non-petroleum fuels. The most ambitious program is the one in Brazil which uses sugarcane.

In 1980, Brazil mixed about 3.8 million tons of sugarcane alcohol with gasoline, in a 20 percent alcohol to 80 percent petroleum ratio. The program, begun in 1974 and completed in 1979, is designed to produce by 1985 10.7 million cubic meters of ethanol a year (compared with 1 million cubic meters in 1974); of this figure, 3 million cubic meters will be used by 3 million vehicles operating on pure alcohol, which will require the establishment of a special distribution system.

While sugarcane alcohol, despite the favorable conditions prevailing in Brazil, is still more expensive to produce than gasoline, its production is helping Brazil to cut back on its petroleum imports, to control the international price of sugar, and also to provide work for its agricultural labor force.

Other countries have begun experimental programs on replacement fuels (such as Japan, the FRG, and Canada). Some states in the United States are already selling gasohol (10 percent ethanol and 90 percent gasoline), which can make use of corn and corn alcohol surpluses. But in 1981 gasohol will make up only 0.5 percent of the automotive fuel consumed in the United States.

INDUSTRIAL TECHNOLOGY

NEW PIG IRON PROCESSES COMPETE FOR EARLY COMMERCIALIZATION

Stockholm NY TEKNIK in Swedish 8 Jan 81 p 3

[Article by Hans Werner: "Eight New Processes in Pig Iron Competition"]

[Text] Eight new pig iron processes based on direct reduction are under development: two in the United States, two in West Germany, one in Canada, and three in Sweden. It is still too early to say which method will win the competition. In Sweden Boliden's "Inred" method has taken the lead, thanks to a conditional government loan of 20 million kronor.

Boliden has now passed Asea-Stora with its "Elred" method, and SKF with its "Plasma-melt" method. Both Boliden and SKF Steel sought money from the government's industry fund. At first SKF Steel received a loan of 7.5 million kronor, having asked for 40 million.

Boliden will construct a demonstration installation at Medfos in Lulea. The plant will commence operations at one-half commercial scale in the beginning of 1982. The potential annual capacity will be something over 50,000 tons.

This method is for small installations, while Elred seems to be best for large installations and the two-stage process. Plasma-melt requires a large amount of electricity, so it should be best suited to countries which have large supplies of power.

At Least Five Foreign Methods

Competitors of the three Swedish methods are two American, two German, and one Canadian method.

The latest contribution is that of the American inventor Albert Calderon. His method is described in the newspaper NORDISK ATERVINNING.

It goes by the name of Ferrocal, and is based on mixing coal with iron ore, which can have a low mineral content.

The mixture goes through a furnace for reduction heating. This consists of a vertical tower made up of several isolated cells, each one tapering at the bottom.

The insides of the cells are of alloy steel. Induction poles surround the outsides of the cells. Induction heating of the cells leads to gasification of the coal and a simultaneous reduction in the solid state of the iron ore. The hot gases rise through the tower and heat the incoming coal-ore mixture before the gas is collected, cleaned, and used for production of electricity or heat.

Drawing Off Batches

Part of the metallic iron in solid form is fed in batches from the bottom of the tower into an induction-heated holding furnace with molten iron. There the desulphurization takes place.

The Ferrocil method can be used both in a scrap iron mill or a modern integrated mill. The point of the method, said NORDISK ATERVINNING, is that the process can use both low-grade iron ore and low-grade coal, and that it is a closed system with minimum problems for the environment.

Resembles the Hoganas Process

According to SKF experts, the method is similar in part to the so-called Hoganas process, which is found in Sweden at Oxelosund and Hoganas.

The same authorities believe that Calderon seriously underestimated the consumption of electricity in the process, and therefore the economic exchange might not be so favorable.

Calderon has received a certain amount of support in an American Congressional report ("Technology and Competition in the Steel Industry") and has previously succeeded with other inventions, among them a ruling for charging the LD [Linz-Donawitz] converter which is used in Belgium and England.

9287

CSO: 3102

SCIENCE POLICY

1981 DRAFT BUDGET FOR MINISTRY OF INDUSTRY PRESENTED

Paris AFP SCIENCES in French 20 Nov 80 pp 1-3

[Text] Scientific Research Policy and Organization. Industry Budget/France

Paris -- Presentation of industry budget: "Technologic progress must be directed by the citizens," according to Andre Giraud. Upon proposing his budget (see AFP SCIENCES No 236, p 1) to the National Assembly on 13 November, Andre Giraud, minister of industry, indicated that industrial initiative should be generated at the grassroots level and that technologic progress should be directed by everyone.

In this framework, three elements are stressed by the minister: the independence of France, its competitiveness, and its optic in favor of an industrial society.

French Independence

In the energy domain, the budget for the first time now includes credits intended to emphasize the technologic effort for coal utilization, and to speed up the stockpiling of coal resources. These measures will amount to 45 MF (million francs).

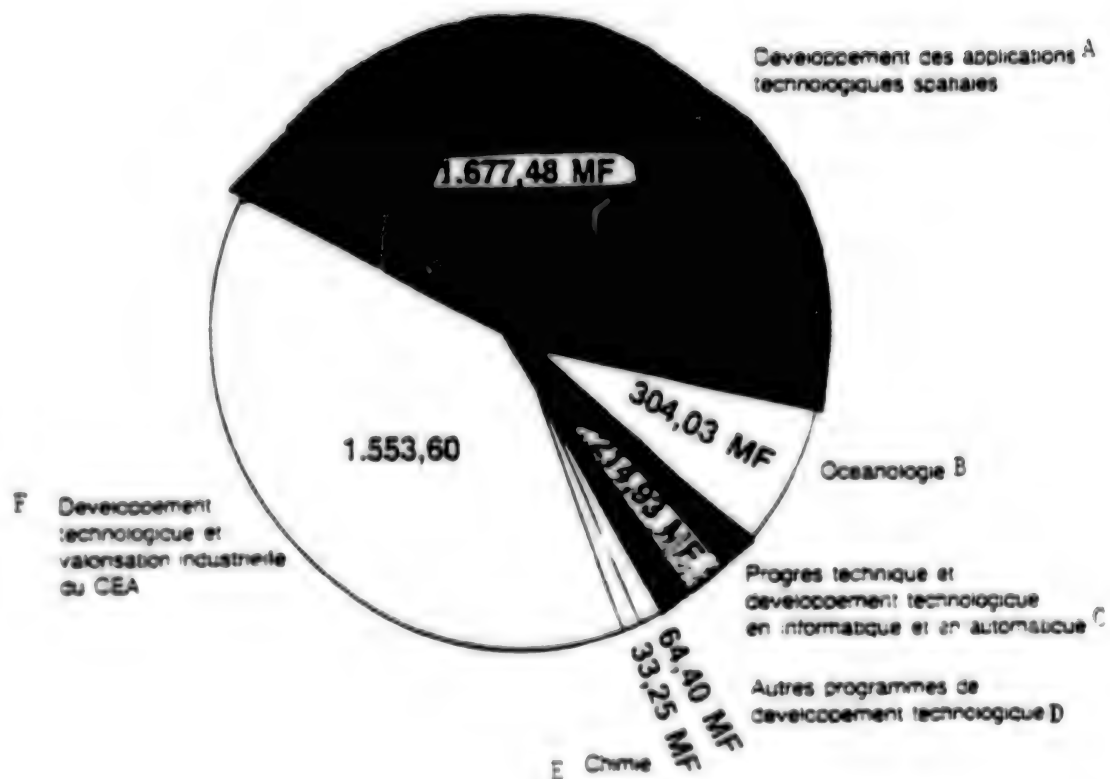
The nuclear power portion of the budget amounts to about 2.452 billion francs. Nuclear safety is growing at the greatest rate (16 percent), while the nuclear debt rate of which is part of the PWR program, is increasing by 80 percent.

The 1981 budget proposal includes 665 MF in energy conservation credits, or an increase of 25 percent over 1980.

For the development of new sources of energy, geothermal power allotments increased by 40 percent, and allocations for the Solar Power Commission reached 199 MF, or an increase of 60 percent.

In the raw material field, we note that BRGM (Geological and Mineral Prospecting Office) allocations have been bolstered by 35 percent, to be shared among prospecting, underground resource assessment, and mining development. And lastly, seabed mineral resources have become a category apart for the first time in 1981, with an endowment of 10 MF.

Technologic development policy (program allowances + ordinary expenses)



- Key:
- (A) Development of space technology applications
 - (B) Oceanology
 - (C) Technical progress and technologic development in information processing and automation
 - (D) Other technologic development programs
 - (E) Chemistry
 - (F) Technologic development and industrial exploitation at AEC

Industrial and technologic development policy. Ministry of Industry allocations.

Total program allowances (AP) for policy	2,955.80 MF
Total payment credits (CP)	2,673.40 MF
Total ordinary expenses (DO)	1,661.40 MF
Total AP + DO	4,617.26 MF

The above is distributed as follows:

	AP	CP	DO	AP + DO
Industrial policy:	714.07	607.94	55.505	769.57
Industrial prospecting	7.650	5.00	55.505	63.155
Adaptation and development of production structure	113.00	151.45	---	113.00
Industrialization of new products	54.55	50.00	---	54.55
Promotion of audiovisual techniques	10.80	10.80	---	10.80
Assistance to small and medium-size industry	58.63	69.15	---	58.63
Development of data processing industries and applications	469.44	321.54	---	469.44
Technologic development policy:	2,241.73	2,065.53	1,605.96	3,847.69
Technologic development and industrial exploitation of AEC	500.50	472.10	1,053.10	1,553.60
Development of space technology applications	1,407.08	1,294.08	270.40	1,677.48
Oceanology	200.35	187.55	103.68	304.03
Technical progress and technologic development in data processing and automation	117.60	95.60	97.33	214.93
Chemistry	9.50	9.50	23.75	33.25
Other technologic development programs (School of Mines, scientific and technical information)	6.70	6.70	57.70	64.40

Competitive Industry

In addition to the investment support, we note the figures for industrial policy and development, which amount to 4.617 billion francs, including 769 million for industrial policy. In this respect, the establishment of CODIS (Ministerial Committee in charge of formulating guidelines for industrial development of a strategic nature), makes it possible to identify major future projects (among which are mass-utilization electronics, office automation, offshore exploration, and bio-industry).

Three strategic programs: information processing, 30 percent increase in allocations; nuclear program and transfer policy, 14 percent increase in funds for AEC (about 1.550 MF); and finally, the CNES (National Center for Space Studies) endowment, which reaches 1.678 MF for an increase of 22.5 percent.

11,023

CSO: 3102

SCIENCE POLICY

MINISTER OF INDUSTRY STRONGLY SUPPORTS AUTOMATION

Paris INDUSTRIES ET TECHNIQUES in French 31 Dec 80 pp 32-34

[Interview with Industry Minister Andre Giraud on the importance of automation in industry, by INDUSTRIES ET TECHNIQUES; date and place not given]

[Text] Automation? "Not only desirable but essential." In the exclusive interview he granted us, the minister of industry is quite clear. "Essential throughout industry, in large companies as in small," Andre Giraud quickly adds. "Foreign competition and our high wage level are constantly forcing us to improve our productivity," he says. But the minister of industry is well acquainted with the practical difficulties encountered in promoting automatic equipment, particularly in the PMI [Small and Medium-size Industries]. To speed up the process, he relies as much on financial facilities, such as the billion francs in compensating loans recently announced by the president of the republic, as on the influential action and advice of various technical centers and specialized companies.

[Question] In your opinion, automation in industry is inevitable. Why?

[Answer] First, because of new possibilities for its application.

It must be said that, until now, automation had been applied only to continuous-production processes--in the chemical, cement and petroleum industries--or to mass production on a large scale, as in the automobile sector with specialized assembly lines worked out for a given product (sequential operations, conveyors and the like).

Progress made during the last few years through new forms of technology--particularly minicomputers--have opened up a vast field for automation in small and medium-series production, which includes nearly 70 percent of the production of manufactured goods.

Furthermore, automation is one of the most effective tools we have to attain the high level of performance we need throughout industry; I repeat, in all our industry and not just in strategic sectors. Automation improves quality and lowers manufacturing costs. Since our country has a high wage level, we

must necessarily have a high level of productivity. And inasmuch as our country welcomes international competition and, of necessity, is obliged to accept it, we must be competitive and capable of measuring up to our competitors in large industrialized countries.

For all these reasons, automation in industry is not only desirable but essential.

[Question] Must we import the necessary equipment?

[Answer] Your question is significant.

The French very often believe--but wrongly--that their industry is completely dependent on foreign sources for production equipment. However, it should be recognized that French machinery production has made very substantial progress in the last few years. Nowadays, although we import many machines, we export still more.

In this field, our trade surplus in 1979 was nearly 5 billion francs. And we are gradually opening up new export channels; some of our machinery manufacturers enjoy an excellent technical reputation abroad.

This being said, it is true that, with regard to automation, certain countries have been more successful than France in mastering development technologies and are therefore ahead of us to some extent.

That is why the authorities have adopted a number of measures to promote the development of "automated industries." It is in this spirit that robotization has been considered among the priority subjects of CODIS (Guidance Committee for the Development of Strategic Industries). Let us be clear: robotization does not mean just the manufacture of the robots themselves but, rather, all the elements involved in plants adaptable to that type of manufacture--automated assembly and processing machines and any other components which are a part of automation.

I should like to recall the CODIS objective: it is to induce the authorities to help strategic industries achieve a faster rate of development than their own resources--strictly speaking--permit.

I should also like to stress another procedure which, I believe, deserves special mention. I am speaking of assistance for innovation. As a matter of fact, the development of new automated mechanisms or systems involves great effort in the form of research and development. The government is participating in this development effort through ANVAR (National Agency for the Valorization of Research), which has credits allocated in the budget of the Ministry of Industry.

Assistance for innovation, which may represent as much as 50 percent of the cost of the program, is a reimbursable subsidy in case of success, and this facilitates the development of new automative systems.

[Question] What is the government doing or what will it do to help companies become properly equipped? Do you think special tax-relief measures are desirable?

[Answer] As you may know, the government has adopted a number of measures to help companies become properly equipped.

First, I should like to cite the method of decreasing amortization. It is true that this is an old procedure, but we must remember that, by its very nature, decreasing amortization promotes the rapid replacement of equipment and, consequently, the development of automated systems.

Another measure of a general nature--one which is very recent--is a like concern for promoting investment in private enterprise. I am speaking of a 10 percent tax deduction allowed on orders for equipment.

As you may know, this measure will apply throughout the duration of the Eighth Plan. It represents a sizable financial effort by the state.

Moreover, you have noted that on 8 December the president of the republic announced that 1 billion francs in compensating loans would be allocated to finance equipment for robotization.

Lastly, I should like to recall the action taken by ADEPA (National Agency for Automated Production). This association, created in 1968 by machinery and machine-tool industrialists and their professional unions with the aid of the authorities, was precisely for the purpose of promoting the development of automation in small and medium-size industries.

ADEPA first tried to facilitate the use of numerically controlled machine tools by the PMI. In order to overcome possible resistance, a trial procedure was devised whereby the industrialist could return the machine after a probationary period of 2 years, if he felt that it did not live up to his expectations.

This experiment was highly successful inasmuch as more than 400 numerically controlled machine tools were placed in plants through that procedure, particularly in the PMI, without a single one being returned to the supplier at the end of the trial period. In fact, the success of the procedure is due largely to the role ADEPA played in providing companies with advice and technical assistance and training their personnel.

[Question] In your opinion, do we have engineers and technicians essential for industrial plants? Is it not necessary to make a special effort to familiarize them with these new production methods?

[Answer] We must do our best to train high-school or university students to use these new techniques. It is in this spirit that the "10,000 minicomputer" program was launched in lycees. With the same objective in mind, we are facilitating the purchase of the latest machine tools by our educational institutions so that the students may become familiar with the techniques they will have to use when they enter industry.

We have helped equip higher institutions of learning. We are now making sure that the replacement of machine tools in lycees and colleges permits the introduction of new techniques.

Lastly, I should like to call attention to the role technical centers must play on this subject, to the connection between basic research and industry. They must promote the spread of technical progress and serve as true centers of continuous training. CETIM (Technical Center for Mechanical Industries) has now organized several study sessions on robotization.

I intend to ask the technical centers to give special attention to this training effort.

This sequence of events has led me to ask ADEPA--which receives help from the ministry to cover part of its operating expenses--to expand its field of action.

The same trial procedure* is now being applied to robots, textile machines of "advanced concept" (that is, automated) and equipment for the agricultural food industry. Other types of machines will subsequently be considered by ADEPA as progress is made in automation.

Thus, I believe we have the overall means to facilitate the introduction of automated processes in industry, particularly in the PMI. I do not believe it necessary to add any specific tax relief.

[Question] Some say automation will lead to unemployment. Do you believe this fear to be well-founded?

[Answer] People see the jobs which are eliminated but do not see those which are created. Hence, at times there is a temptation to draw premature conclusions. However, refusing to replace equipment is the surest way to become obsolete and gradually deteriorate.

It is true that automation will eliminate jobs, but it is no less certain that it will create others; and no one can seriously predict at this time what the ratio will be between the jobs which are created and those which are eliminated.

*This procedure is now called MECA (Machines and Equipment of Advanced Concept).

On the other hand, what is certain is that the jobs created will be jobs of the future and that those which were eliminated were already threatened. The new jobs will be on a higher quality and compensation level and will be in keeping with the ambition we can and should have for our country's industry. The added wealth obtained through greater productivity and strengthened exports will create new demand which will have to be satisfied. And this will create still more jobs, provided our economy adapts itself to the reality of that demand and our needs. The important point is to see that this adaptation takes place.

In any case, I have observed great unanimity on the subject of automation in France. Recently in the senate, all groups were agreed that our country needs to take a strong position in this area. And this desire to go forward is not denied by the unions; on the contrary, it is being supported.

8568
CSO: 3102

SCIENCE POLICY

BRIEFS

INDUSTRIAL STRATEGY EXAMINED--Paris--French industrial strategy was the principal topic of discussion at an interministerial committee meeting held on 19 December in Matignon under the chairmanship of Raymond Barre. A plan of action to be taken by CODIS (Committee for the Development of Strategic Industries), created in September 1979, was allegedly established at that time, according to a reliable news source. CODIS, whose mission is to carry out measures aimed at strengthening industry in spheres of activity considered vital to the future of our national economy, is now devoting its efforts to seven areas, we are told: underwater projects, general-public electronics, bureaucracy, bioindustry, energy-saving devices, robotization and innovation in the strategic textile sector--all given priority status. A total of 21 projects have been submitted by companies, and about 12 of them have been approved by the CODIS management committee (five projects having been presented by the PMI [Small and Medium-size Industries]). It is estimated that investments for the above action will come to 8 billion francs between 1980 and 1985. Moreover, about 20 proposals are being studied. [Text] [Paris AFP SCIENCES in French 25 Dec 80 pp 3-4] 8568

CSO: 3102

END

END OF

FICHE

DATE FILMED

25 Feb. 1981



